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Dingler

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[54] **DISHWASHER WITH A TUB SUPPORT**

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[73] Assignee: **Whirlpool Corporation**, Benton Harbor, Mich.

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Related U.S. Application Data

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[51] **Int. Cl.**[7] **A47B 91/00**

[52] **U.S. Cl.** **312/351.7**; 312/228; 134/201

[58] **Field of Search** 312/228, 332, 312/351.7; 248/676, 678, 188.91, 316.8, 188.8; 134/201

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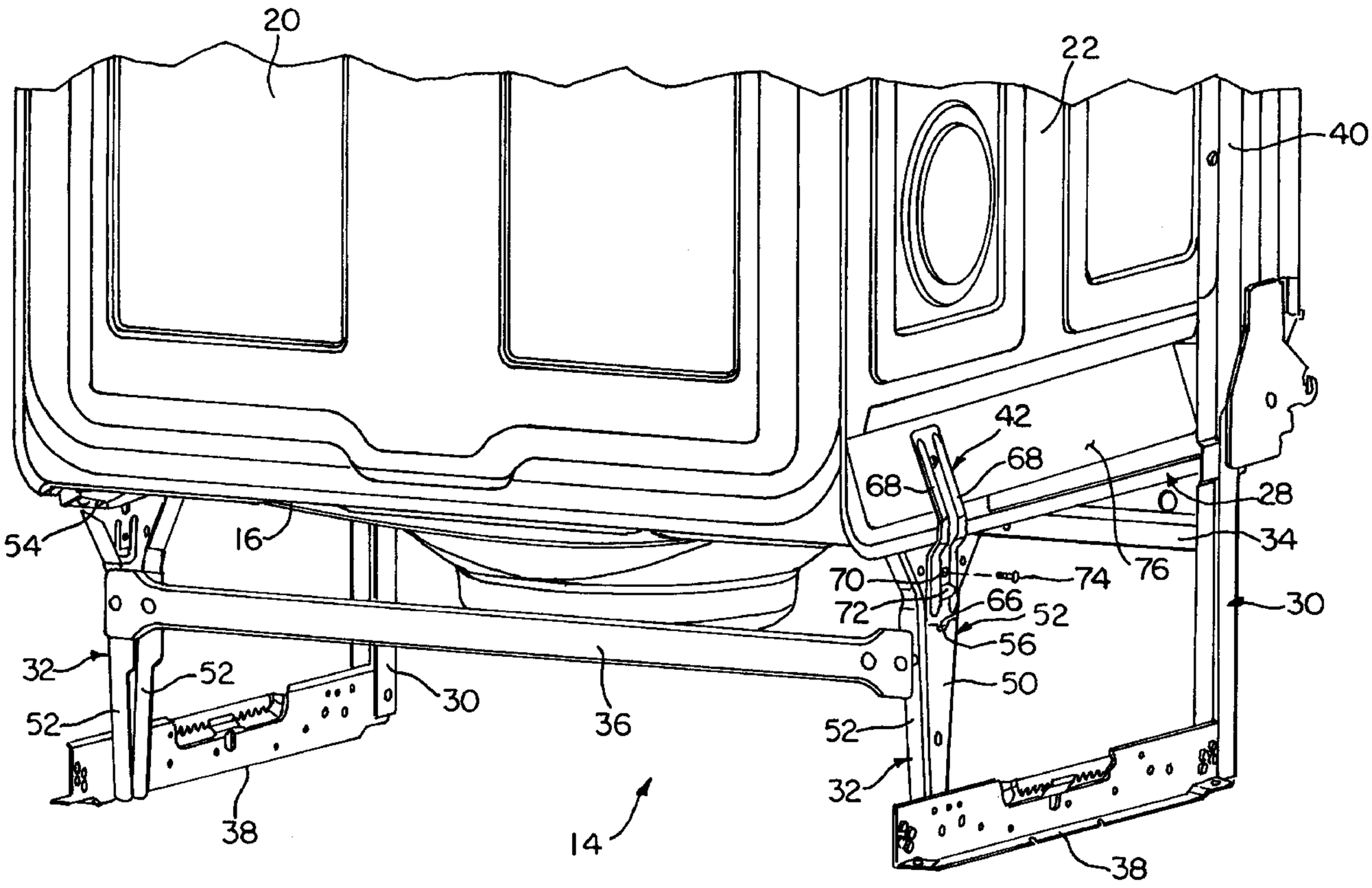
Assistant Examiner—Gerald Anderson
Attorney, Agent, or Firm—Andrea Powers Denklau; Thomas J. Roth; Robert O. Rice

[57] **ABSTRACT**

An automatic dishwasher comprising a metal wash tub mounted to a structural frame. The metal tub comprises multiple sides, which are welded together to form a weldment. The structural frame comprises a rear leg that is positioned beneath the bottom wall of the metal tub adjacent the weldment formed by the sidewall and the bottom wall. A retainer is mounted to the face of the leg and abuts the sidewall to mount the rear of the metal tub to the structural frame. The retainer conforms to the shape of the leg, weldment, and the sidewall to apply a clamping pressure thereto to clamp the weldment and the corner of the metal tub formed by the junction of the sidewall and the bottom wall between the retainer and the leg. The retainer and the leg have positioning means and alignment means to position and align the retainer relative to the leg for quick and easy assembly.

12 Claims, 4 Drawing Sheets



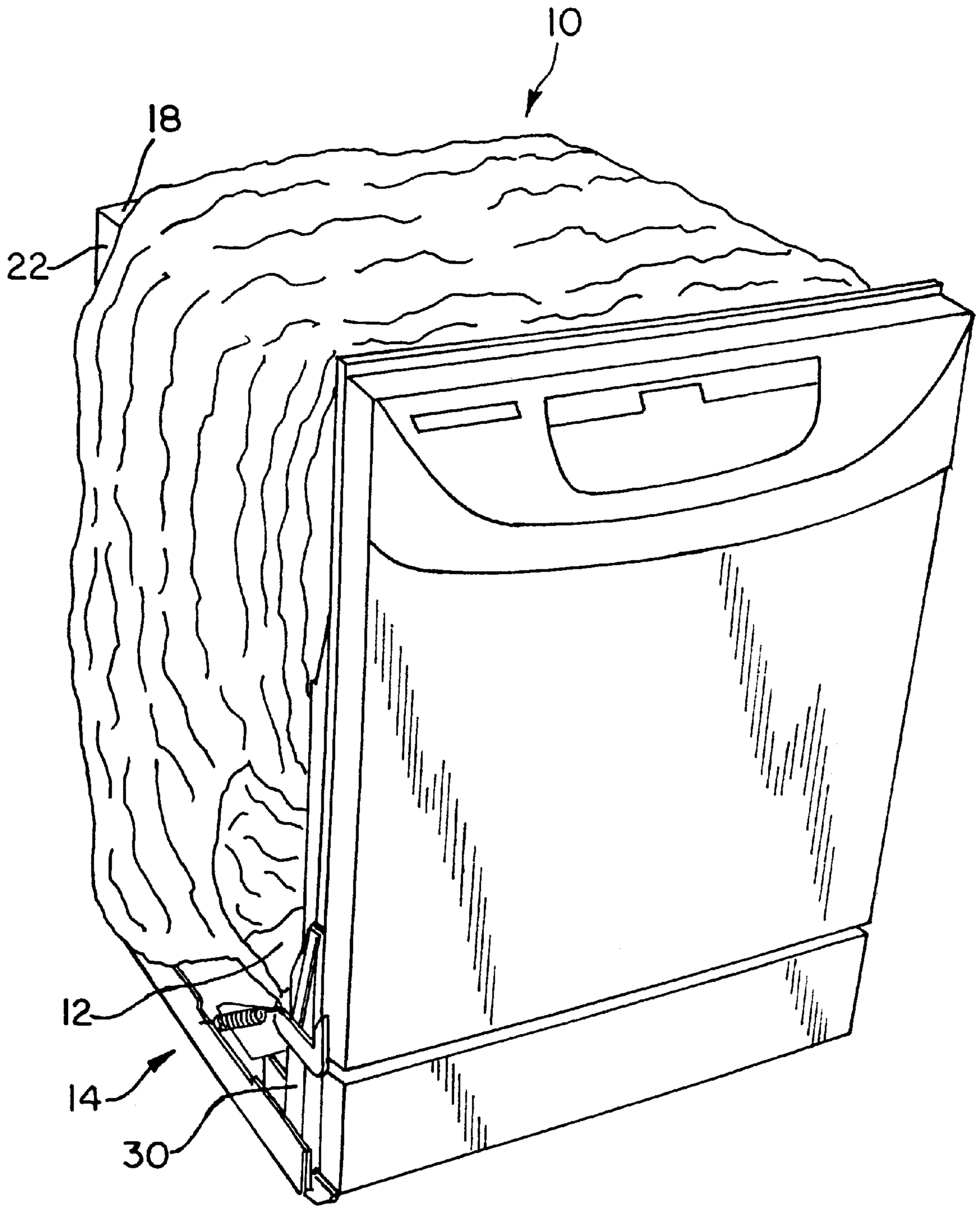


FIG. 1

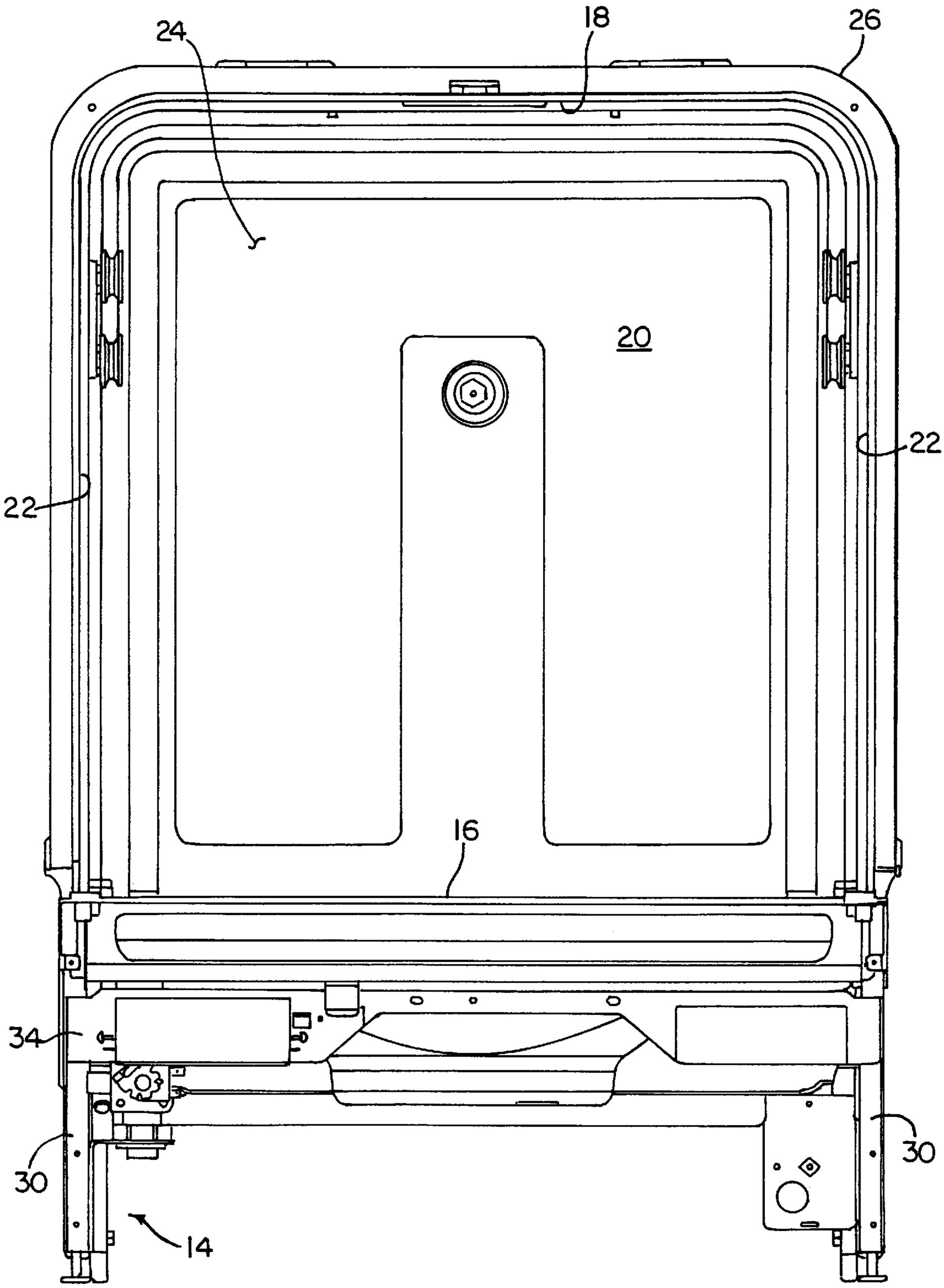


FIG. 2

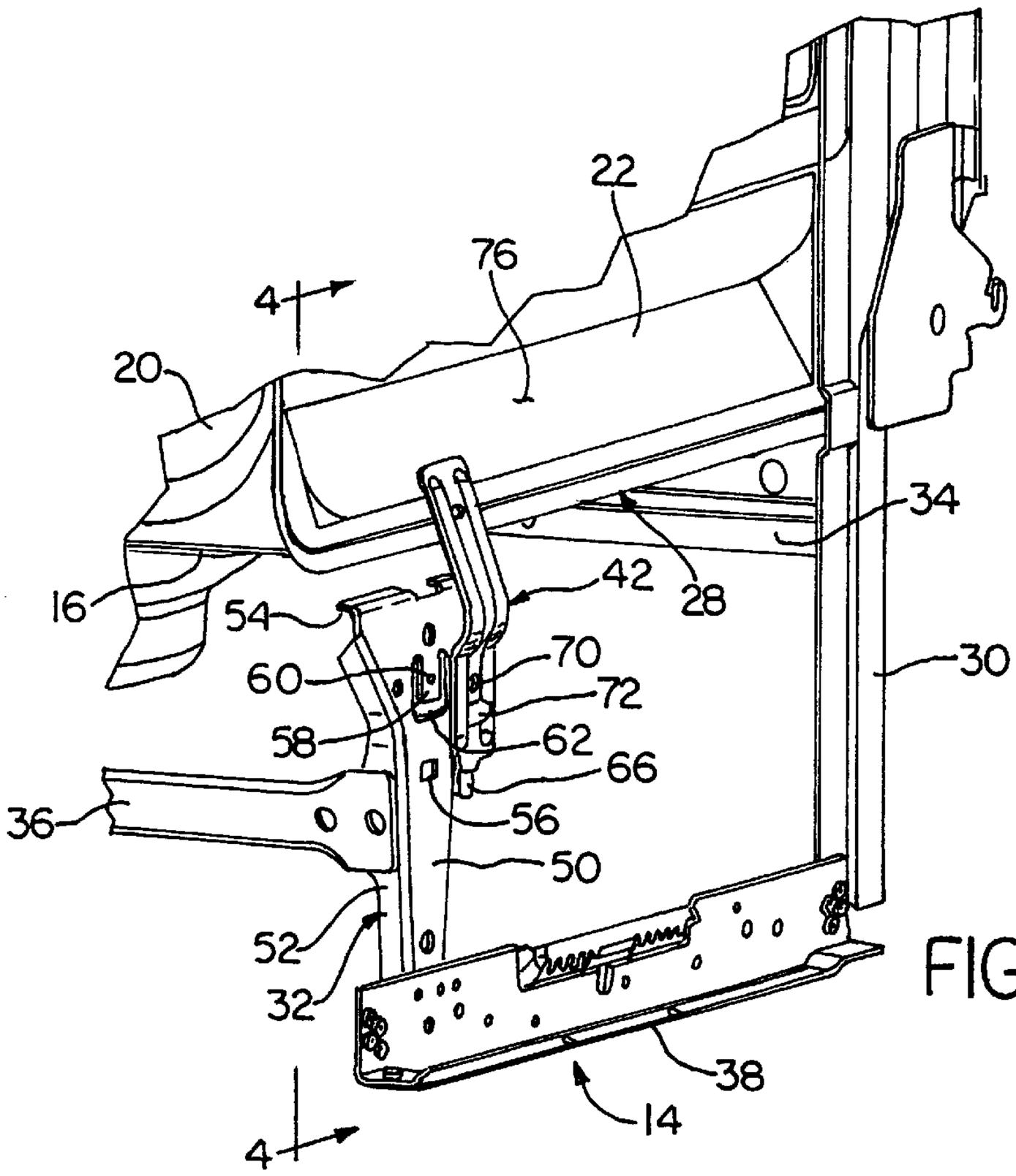

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FIG. 3

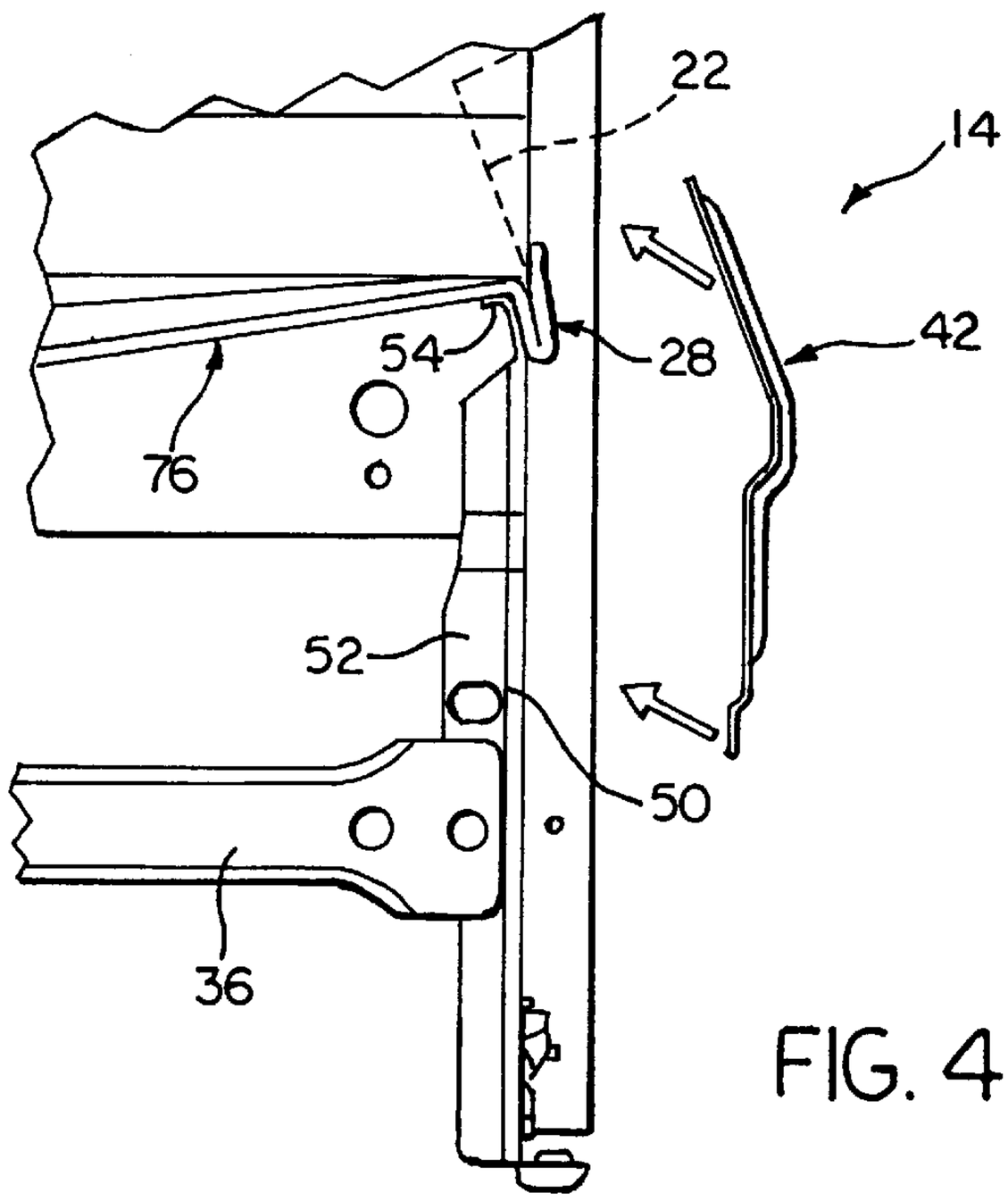
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FIG. 4

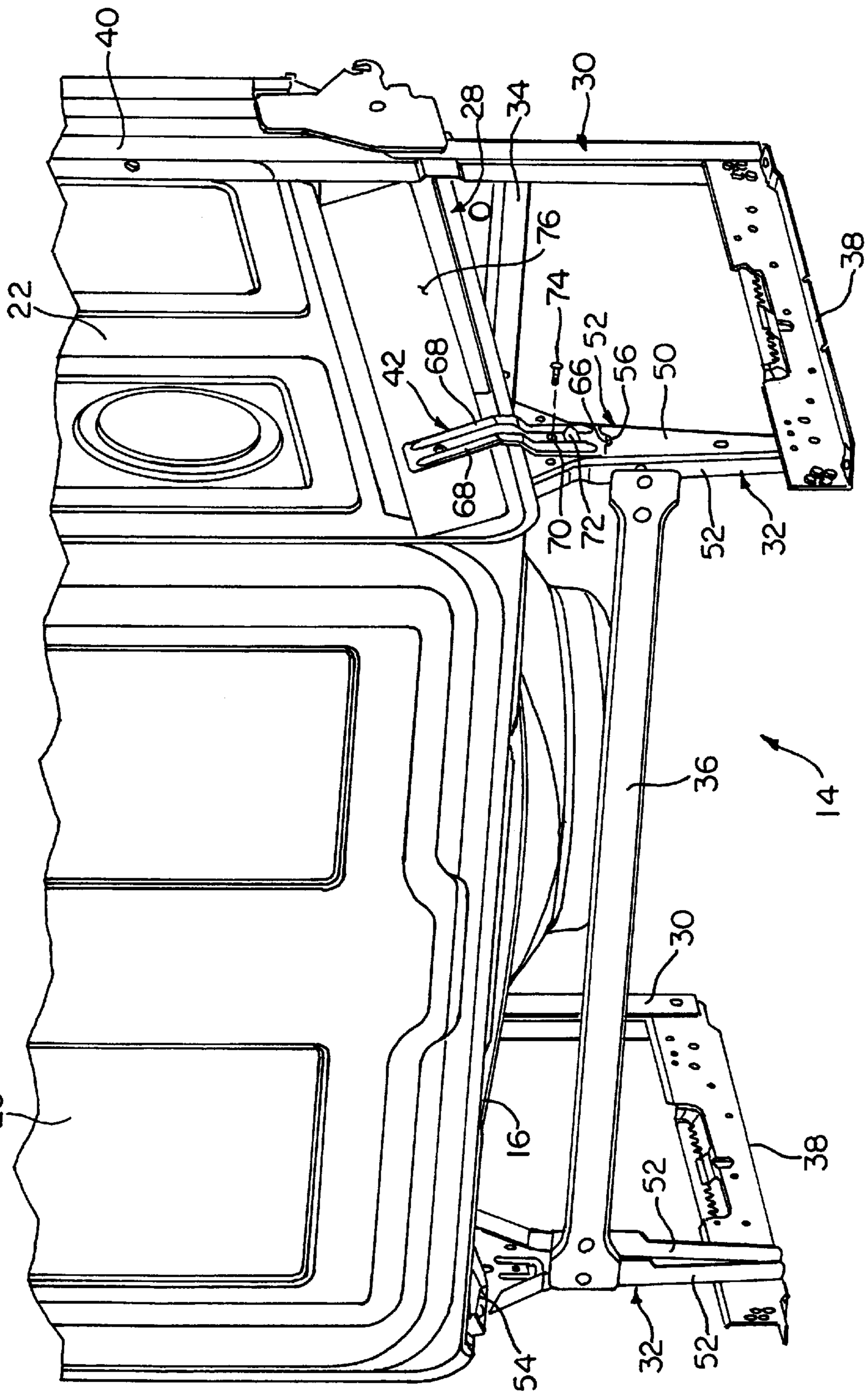
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FIG. 5

DISHWASHER WITH A TUB SUPPORT

This application claims the benefits of U.S. Provisional Application No. 60/036,104 filed Jan. 14, 1997.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to an automatic dishwasher; and, more particularly, to an automatic dishwasher with a tub support for a metal tub.

2. Description of the Related Art

Most contemporary automatic dishwashers comprise a plastic wash tub supported by a structural frame. The plastic wash tub has an open face, which is sealed by a door pivotally mounted to the structural frame. For economy, the plastic wash tub is normally molded as a single piece having a bottom wall, top wall, rear wall and opposing sidewalls. The plastic tub is also molded with a channel-shaped clip, located on the sidewalls near the junction of the sidewall, bottom wall and rear wall. The structural frame generally comprises a collar portion, which surrounds the open face of the tub, and a pair of rear legs. The collar and the rear legs are connected by various other structural members.

During the operation of the dishwasher, the wash tub is subjected to varying forces because of swirling water sprayed during the wash process. Also, the wash tub is subjected to forces from the loading of the dishracks, which are supported by the sidewalls of the wash tub. The collar generally provides sufficient mounting of the face of the tub to adequately support and stabilize the front portion of the tub. To stabilize the rear of the tub, the legs are adapted to be received within the clips molded in the lower rear corner of the wash tub. The combination of the collar and the molded-in channel-shaped clips generally provide adequate support and stability for automatic washers with plastic wash tubs.

However, the combination of the collar and the clips are not useable for a metal tub because the channel-shaped clips cannot be molded in the metal tub nor can they be stamped or formed in the metal tub. A potential solution would be to weld clips to the metal tub sidewalls, but welding is a relatively slow and expensive assembly technique and is avoided whenever possible, especially in high volume products such as dishwashers. Therefore, there is a need for a simple and quick solution to mounting a metal wash tub to the structural frame in a dishwasher when a metal tub is used.

SUMMARY OF THE INVENTION

The invention solves the problem associated with the unsuitability of plastic tub mounting techniques for metal tubs and provides a viable, simple and inexpensive mounting of the metal tub. The invention is a dishwasher comprising a metal tub having a bottom wall, a top wall, opposing sidewalls, and a rear wall, which define an open-faced chamber in which dishes and the like are received for washing. The dishwasher includes a structural frame for supporting the metal tub, including a leg abutting the bottom wall to support a portion of the metal tub. A retainer is mounted to the leg and abuts a sidewall to retain the metal tub to the structural frame. Preferably, the clamp applies a clamping force to the sidewall to help retain the metal tub.

In the preferred embodiment, the junction of the bottom wall and the sidewall forms a weldment. The leg is constructed with a platform that supports the bottom wall and which is positioned behind the weldment. The leg has a face to which the retainer is mounted. The retainer conforms to the shape of the sidewall. The weldment is pinched between the leg and the retainer to mount the tub to the structural frame. Also, the sidewall can have an inwardly sloping portion near the weldment and the retainer conforms to the shape of the inwardly sloping portion so that the clamping force of the retainer tends to hold the tub between the retainer and the leg.

To ease assembly of the automatic dishwasher, the leg can have a positioning aperture and the retainer can have a positioning tab, which is inserted into the positioning aperture to position the retainer relative to the leg during assembly. Additionally, the leg can have an alignment key and a pilot aperture and the retainer can have a corresponding alignment guide and a fastener aperture. When the alignment key is received within the alignment guide, the fastener aperture is aligned with the pilot aperture and a fastener can be inserted through the fastener aperture and into the pilot aperture to mount the retainer to the leg.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front perspective view of an automatic dishwasher according to the invention.

FIG. **2** is a front view of the automatic dishwasher of FIG. **1** with the door and the sound absorbing material removed for clarity.

FIG. **3** is an exploded view of the lower rear portion of the dishwasher of FIG. **1** with the sound absorbing material removed for clarity.

FIG. **4** is a sectional view of FIG. **3** taken along line **4**—**4**.

FIG. **5** is an assembled view of FIG. **3**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. **1** illustrates an automatic dishwasher **10** according to the invention. The dishwasher **10** as illustrated is a built-in type and does not have an outer cabinet. A sound absorbing material and a door have been removed for clarity in FIGS. **2**–**5**. The invention is not limited to built-in dishwashers and can be used in many different types of dishwashers.

Referring to FIGS. **1**–**3**, the dishwasher **10** comprises a metal tub **12** and a structural frame **14** on which the metal tub **12** is supported to stabilize any movement of the metal tub **12** associated with the operation of the dishwasher **10**, such as the effects of water sprayed within the dishwasher **10** or the loading of the wash baskets (not shown), which mount to the metal tub **12**.

The metal tub **12** comprises a bottom wall **16**, a top wall **18**, a rear wall **20**, and opposed sidewalls **22**, which define an open face **24** having a circumferential flange **26**. The metal tub **12** is preferably made from stainless steel. To form the metal tub **12**, each of the junctions of each of the walls is welded together to form a weldment **28** (FIGS. **3**, **4** and **5**).

The structural frame **14** comprises front legs **30** and rear legs **32**. The front legs **30** are connected by a front brace **34** and the rear legs **32** are connected by a rear brace **36**. Each of the front legs **30** is connected to a rear leg **32** by a side rail **38**. A collar **40** extends from the front brace **34** and couples with the circumferential flange **26** to mount the open face **24** of the metal tub **12** to the structural frame **14** in a well known manner. The rear of the metal tub **12** is supported by rear legs **32**, which are positioned so a portion of the rear legs **32** abuts the bottom wall **16**, and a retainer **42**,

which is mounted to the rear leg **32** and shaped to conform to the sidewall **22**. Preferably, the retainer **42** applies a clamping force to the sidewall **22** to help mount the rear of the metal tub **12** to the structural frame **14**.

FIGS. **3** and **4** illustrate in greater detail the mounting of the rear of the metal tub **12** to the structural frame **14**. Although a pair of rear legs and their corresponding retainers are shown in the drawings, only one will be described with it being understood that the description applies to both rear leg and retainer combination. As can be seen in FIGS. **2** and **3**, the rear legs **32** are made from a sheet material that is formed or stamped to define a face **50** from which extends sides **52** and a flange **54**. Flange **54** functions as a support platform for supporting the bottom wall **16** of the metal tub **12**. A positioning aperture **56** and a tang **58** are formed in the face **50**. The tang **58** has a pilot aperture **60** formed in the body of the tang **58** and an alignment key **62** at the terminal end of the tang **58**.

The retainer **42** comprises a generally rectangular planar body having a positioning tab **66** extending from a lower end of the retainer **42**. A pair of stiffening ribs **68** run parallel to each other and extend along the longitudinal axis of the retainer **42**. A fastener aperture **70** is provided in the body of the retainer **42** between the stiffening ribs **68**. An alignment guide **72** is provided between the stiffening ribs **68** and below the fastener aperture **70**.

Referring to FIGS. **3–5**, the rear of the metal tub **12** is mounted to the structural frame **14** by positioning the rear legs **32** so that the flange **54** of the rear legs **32** abuts the lower surface of the bottom wall **16** and behind the weldment **28**. The retainer **42** is then mounted to the rear leg **32** and secured by any suitable fastener **74** passing through the fastener aperture **70** and the pilot aperture **60**.

The task of quickly and simply mounting the retainer **42** to the rear leg **32** is accomplished by the structure of the leg and retainer. First, the positioning tab **66** is placed within the positioning aperture **56** to generally position the retainer **42** relative to the rear leg **32**. Second, the retainer **42** is rotated toward the rear leg **32** until the alignment key **62** is received within the alignment guide **72** to align the pilot aperture **60** with the fastener aperture **70**. The fastener **74** is then inserted through the fastener aperture **70** and into the pilot aperture **60** where it is tightened to mount the retainer **42** to the rear leg **32**.

Preferably, there is a layer of mastic **76** positioned between the sidewall **22** and the retainer **42** and the bottom wall **16** and the flange **54** of the rear leg **32**. The mastic helps to deaden any sound that otherwise would result if there was direct contact between the rear leg **32** and retainer **42** and the bottom wall **16** and sidewall **22** respectively.

As is best seen in FIG. **4**, the cross section of the retainer **42** generally conforms to the shape of not only the sidewall **22** as previously stated but it also conforms to the face **50** of the rear leg **32** and to the weldment **28**. It is preferred that the cross section of the retainer **42** be slightly bowed or the portion abutting the sidewall **22** be slightly bent in so that when the fastener **74** is tightened, the retainer **42** is drawn in tightly against the sidewall **22** to apply a clamping force to the sidewall **22**. Also, the upper portion of the face **50** conforms to the shape of the weldment **28**.

The advantage of the shapes of the retainer **42** and the rear leg **32** is that the weldment **28** is essentially pinched between the retainer **42** and the rear leg **32** because they contact opposite sides of the weldment **28**. Another advantage arises in that the lower portion of the sidewall **22** angles inwardly and the clamping force applied by the retainer **42** tends to clamp the lower portion of the metal tub **12** formed by the junction of the bottom wall **16** and sidewall **22** between the flange **54** of the rear leg **32** and the retainer **42**.

The combination of the rear leg **32** and the retainer **42** permit the rear portion of the metal tub **12** to be secured to the structural frame **14** without the extra cost and aesthetically displeasing appearance of welding a clip to the metal tub **12**. Additionally, the retainer **42** is quickly and simply mounted to the rear leg **32** because of the positioning and alignment features of the rear leg **32** and the retainer **42**. The reduced cost of the mounting and its simplicity is an improvement over previous dishwashers and solves the problems encountered when using a metal tub.

We claim:

1. A dishwasher comprising:

a metal tub having a bottom wall, a top wall, opposing side walls, and a rear wall, which define an open-faced chamber adapted to receive dishes for washing;

a structural frame for supporting the metal tub and having a leg abutting the bottom wall for supporting a portion of the metal tub;

a retainer mounted to the leg and in contact with one of the metal tub walls to retain the metal tub to the structural frame; and

said leg has an alignment key and a pilot aperture, the retainer has an alignment guide and a fastener aperture, and the alignment guide is adapted to receive the alignment key to align the fastener aperture and the pilot aperture to permit a fastener to pass through the fastener aperture and into the pilot aperture to mount the retainer to the leg.

2. A dishwasher comprising:

a metal tub having a bottom wall, a top wall, opposing side walls, and a rear wall, which define an open-faced chamber adapted to receive dishes for washing;

a structural frame for supporting the metal tub and having a leg for supporting a portion of the metal tub;

a clamp mounted to the leg and in contact with and applying a clamping force to one of the metal tub walls to retain the metal tub to the structural frame; and

the bottom wall and the side wall abut to form a junction and said junction forms a generally downwardly extending weldment, the leg has a platform on which the bottom wall is supported and which is positioned behind the weldment, and the leg has a face and the clamp is mounted to the face of the leg and is shaped to conform to the sidewall to apply a clamping force against the sidewall to retain the metal tub in a substantially fixed position.

3. A dishwasher comprising:

a metal tub having a bottom wall, a top wall, opposing side walls, and a rear wall, which define an open-faced chamber adapted to receive dishes for washing;

a structural frame for supporting the metal tub and having a leg abutting the bottom wall for supporting a portion of the metal tub;

a retainer mounted to the leg and in contact with one of the metal tub walls to retain the metal tub to the structural frame;

the bottom wall and the side wall abut to form a junction and said junction forms a generally downwardly extending weldment and the leg has a platform on which the bottom wall is supported and which is positioned behind the weldment; and

the leg has a face and the retainer is mounted to the face of the leg and is shaped to conform to the sidewall to retain the metal tub in a substantially fixed position.

4. The dishwasher as claimed in claim **3**, wherein the leg has a positioning aperture and the retainer has a positioning tab adapted to be received within the positioning aperture to position the retainer relative to the leg.

5. The dishwasher as claimed in claim **4**, wherein the leg has an alignment key and a pilot aperture, the retainer has an alignment guide and a fastener aperture, and the alignment guide is adapted to receive the alignment key to align the fastener aperture and the pilot aperture to permit a fastener to pass through the fastener aperture and into the pilot aperture to mount the retainer to the leg.

6. The dishwasher as claimed in claim **5**, wherein the leg has a planar face in which is formed a tang, the tang has an aperture defining the pilot aperture and a rib defining the alignment key.

7. The dishwasher as claimed in claim **6**, wherein the leg has a flange extending away from a top portion of the face to define the platform.

8. The dishwasher as claimed in claim **4**, wherein the retainer is an elongated plate having at least one longitudinally extending stiffening rib.

9. The dishwasher as claimed in claim **8**, wherein the retainer has a transversely extending rib defining the alignment guide.

10. A dishwasher comprising:

a metal tub having a bottom wall, a top wall, opposing side walls, and a rear wall, which define an open-faced chamber adapted to receive dishes for washing;

a structural frame for supporting the metal tub and having a leg for supporting a portion of the metal tub;

a clamp mounted to the leg and in contact with and applying a clamping force to one of the metal tub walls to retain the metal tub to the structural frame; and

the leg has an alignment key and a pilot aperture, the clamp has an alignment guide and a fastener aperture, and the alignment guide is adapted to receive the alignment key to align the fastener aperture and the pilot aperture to permit a fastener to pass through the fastener aperture and into the pilot aperture to mount the clamp to the leg.

11. The dishwasher as claimed in claim **10**, wherein the clamp is an elongated plate having at least one longitudinally extending stiffening rib.

12. The dishwasher as claimed in claim **10**, wherein the clamp has a transversely extending rib defining the alignment guide.

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